
DARPA
DARPATech
2002 Symposium
Transforming
Fantasy


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Information
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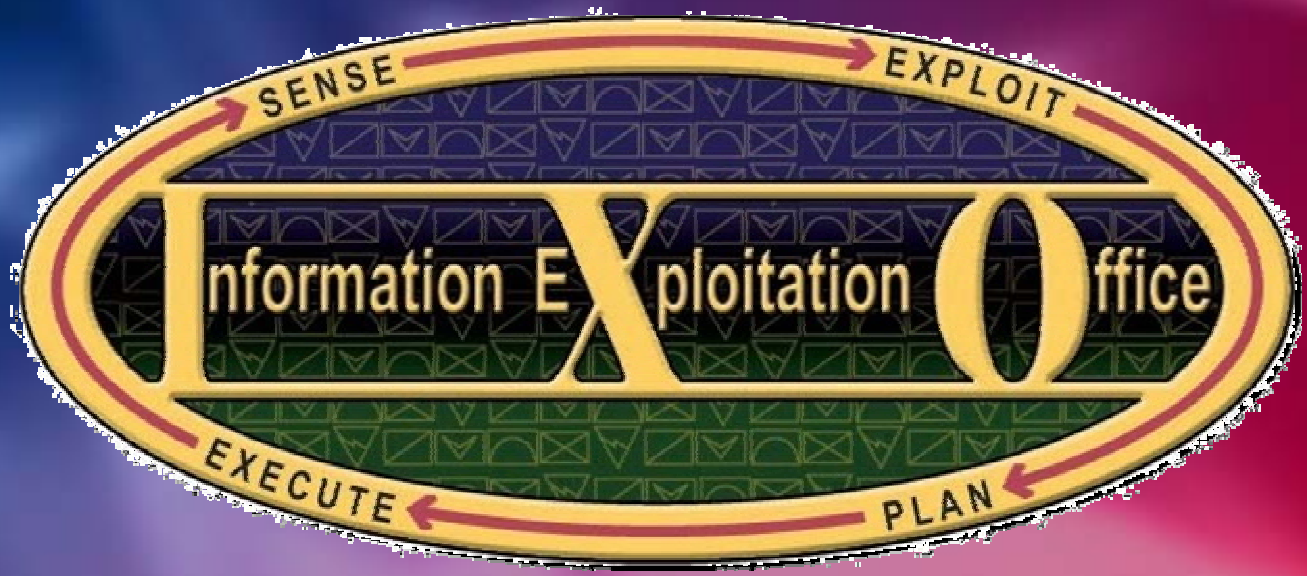

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Context For Future Warfare

- U.S. will face new, challenging opponents
- Rapid, dominant, decisive operations
- Fight with or without reliance on coalition or indigenous forces

Goal: Precisely attack and kill any ground target, anywhere, any time

- High confidence target identification
- Minimal inadvertent collateral damage
- Minimal undesired casualties

C4KISR

C4ISR + Kill = C4KISR

- Find, track and precisely identify targets
- Dynamically command and control weapons and sensors
- Share information

Diverse Targets

FBI TEN MOST WANTED FUGITIVE

MURDER OF U.S. NATIONALS OUTSIDE THE UNITED STATES; CONSPIRACY TO MURDER U.S. NATIONALS OUTSIDE THE UNITED STATES; ATTACK ON A FEDERAL FACILITY RESULTING IN DEATH

USAMA BIN LADEN

Date of Photograph Unknown

Aliases: Usama Bin Muhammad Bin Ladin, Shaykh Usama Bin Ladin, the Prince, the Emir, Abu Abdallah, Mujahid Shaykh, Hajj, the Director

Source: http://www.fbi.gov/mostwant/topten/fugitives/laden.htm

Need diverse technologies

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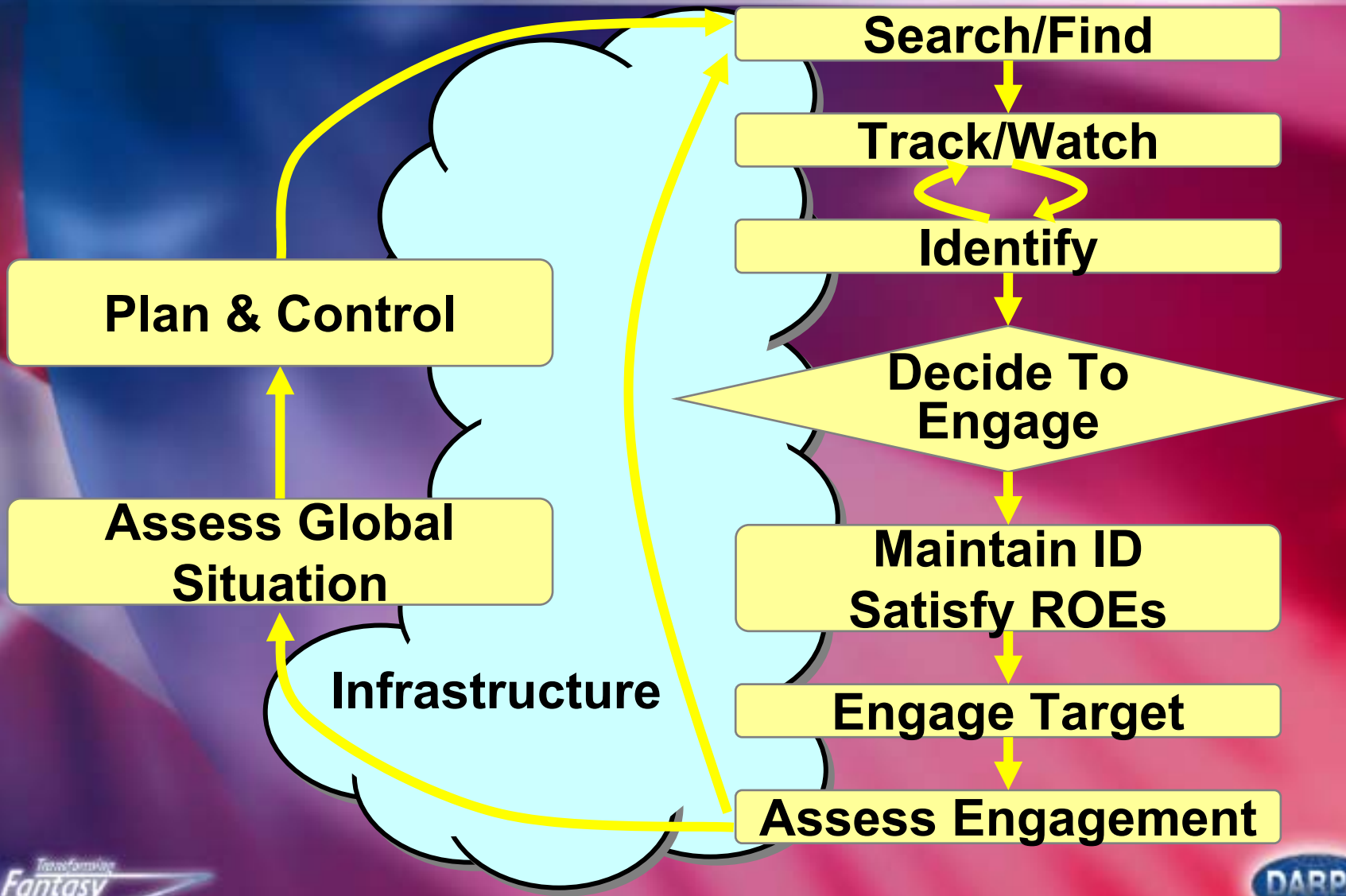
C4KISR Model



Search/Find

- Desired Capabilities
  - Any target, moving/stationary, any terrain
  - Immediate exploitation with minimal HITL
- Potential Solutions
  - Multi-mode, change detection radar
  - Hovering GMTI radar (low MDV) for dismounts and small slow vehicles
  - Rapid multi-platform emitter location

Track/Watch

- Desired Capabilities
  - Continuous automatic tracking
  - Low probability of false association
- Potential Solutions:
  - Ubiquitous multi-phenomenological multi-platform networked sensing
  - Adaptive multiple hypothesis feature/model aided network centric tracking

Identification

- Desired Capabilities
  - Automated high-confidence combat ID
  - Rapidly adapt to new/modified targets
- Potential Solutions
  - Sensors and exploitation with higher dimensionality, multiple-phenomena and diverse viewing geometry
  - Model-based target recognition based on generic target components

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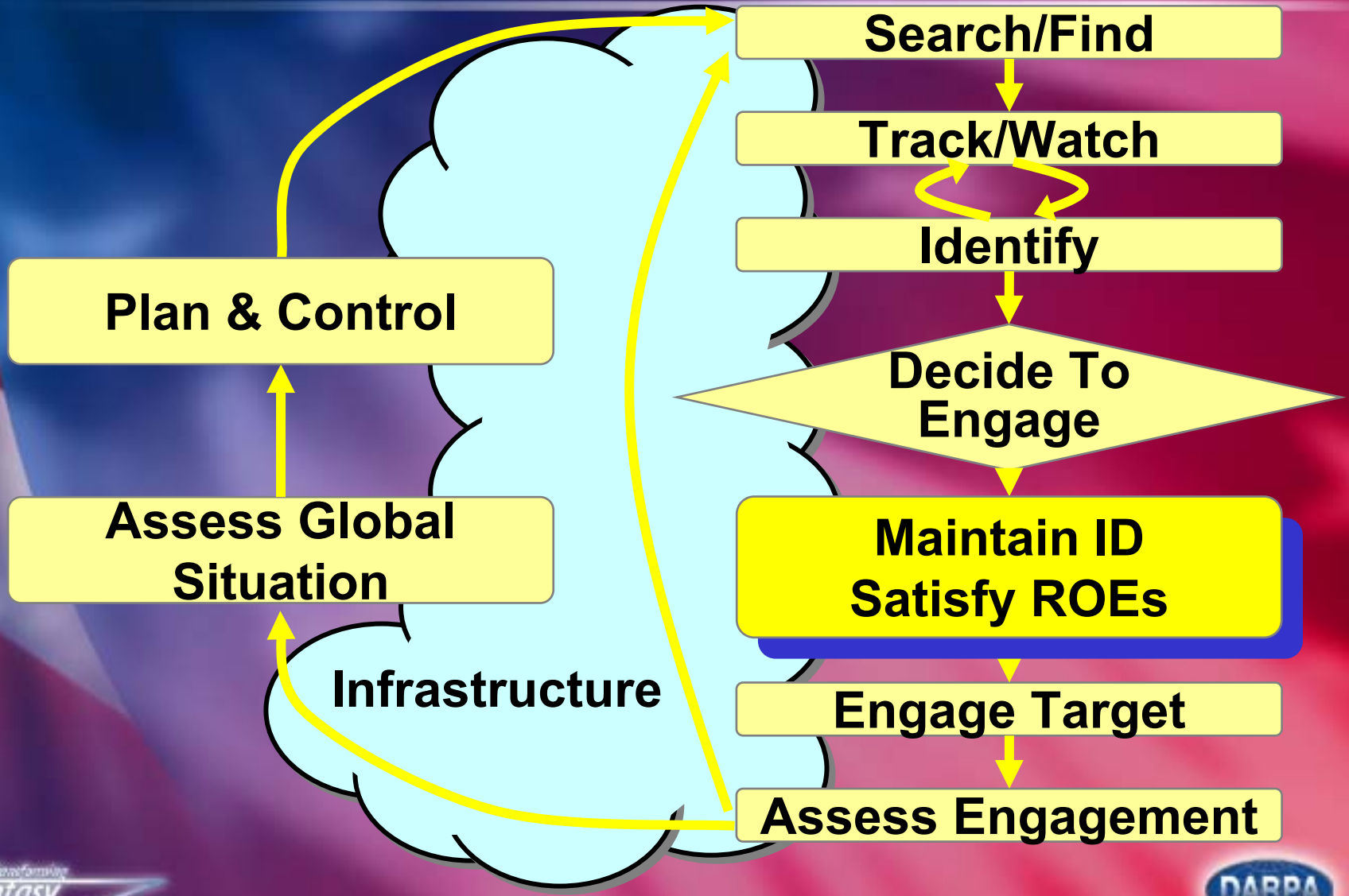
Decide to Engage

- Desired Capabilities
  - Automated assessment of ROE compliance
  - Effective pairing of weapons to targets
- Potential Solutions
  - Sensors and ATR with PID of 99.99%
  - Target pairing that is: effects-based, collateral damage aware, and rapid

C4KISR Model



Maintain ID/Satisfy ROEs

- Desired Capabilities
  - Automatic maintenance of target ID
  - Automatic “safe-to-fire” checks
- Potential Solutions
  - Continuous tracking: multi-platform, multi-sensor/mode, multi environment
  - Close-in sensing/ATR to re-ID and recognize potential collateral damage

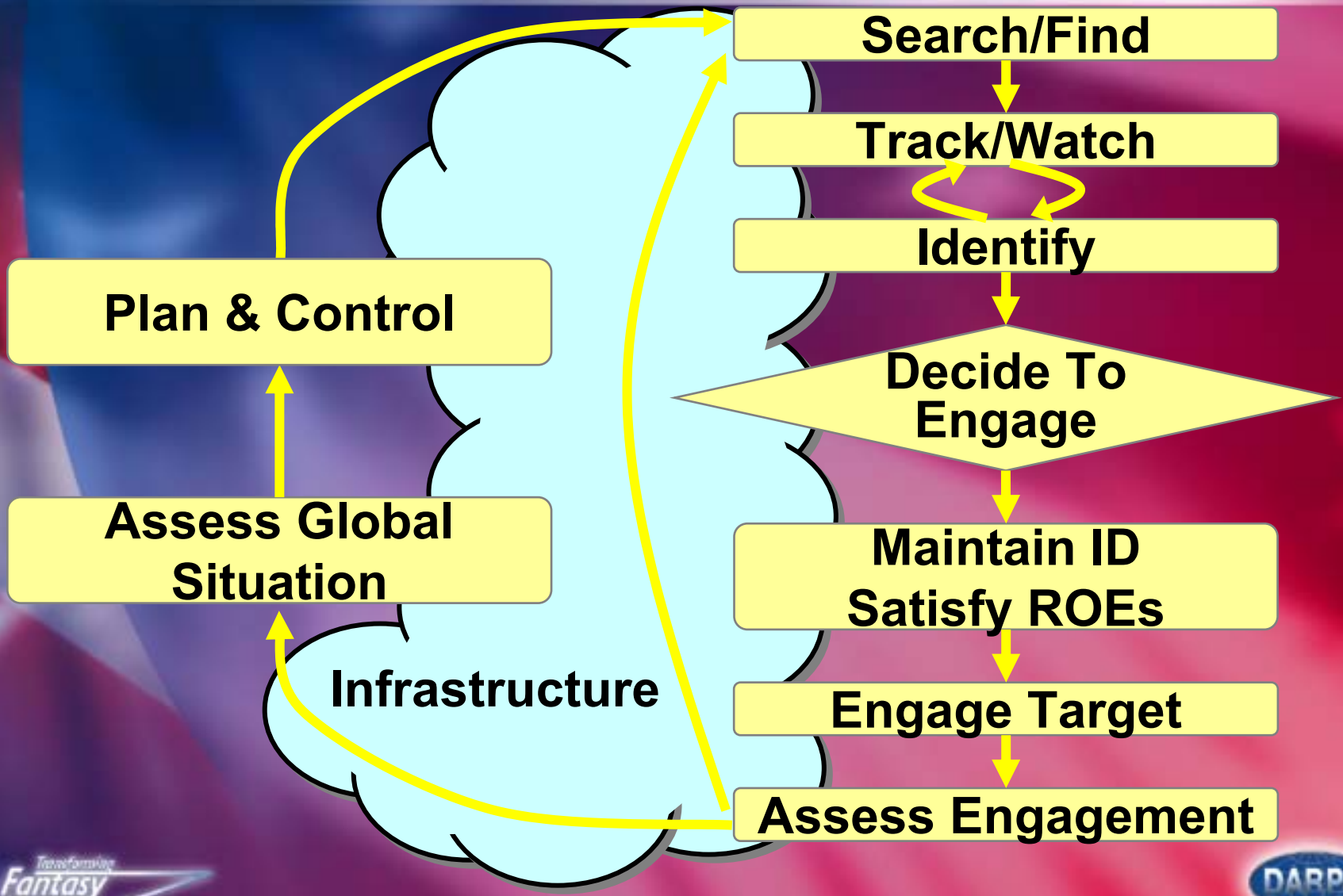
Engage Targets

- Desired Capabilities
  - Continuous off-board control of weapon aim point
  - All-weather, all target seekers
- Potential Solutions
  - Low cost COTS components for weapon datalinks
  - Multi-mode, programmable seekers

Assess Engagements

- Desired Capabilities:
  - Measure significant physical damage or cessation of undesired activity
- Potential Solutions:
  - Change detection and interpretation based on 3D shape or signature
  - Detection of changes in behavior inferred from all sources of data

C4KISR Model



Assess Global Situation

- Desired Capabilities
  - Infer opponent's capabilities and range of possible intent
- Potential Solutions:
  - Courses of action and workarounds
  - Model based inference of functional structures from physical capabilities
  - Leading to effects-based target nomination

Plan and Control

- Desired Capabilities
  - Synchronized routing and scheduling of multi-role platforms
  - Continuous plan generation, assessment and refinement
  - Unified air and ground operations
- Potential Solutions:
  - Real-time capture of plans and events
  - Collaborative synthesis of multi-mission plans from “playbooks”

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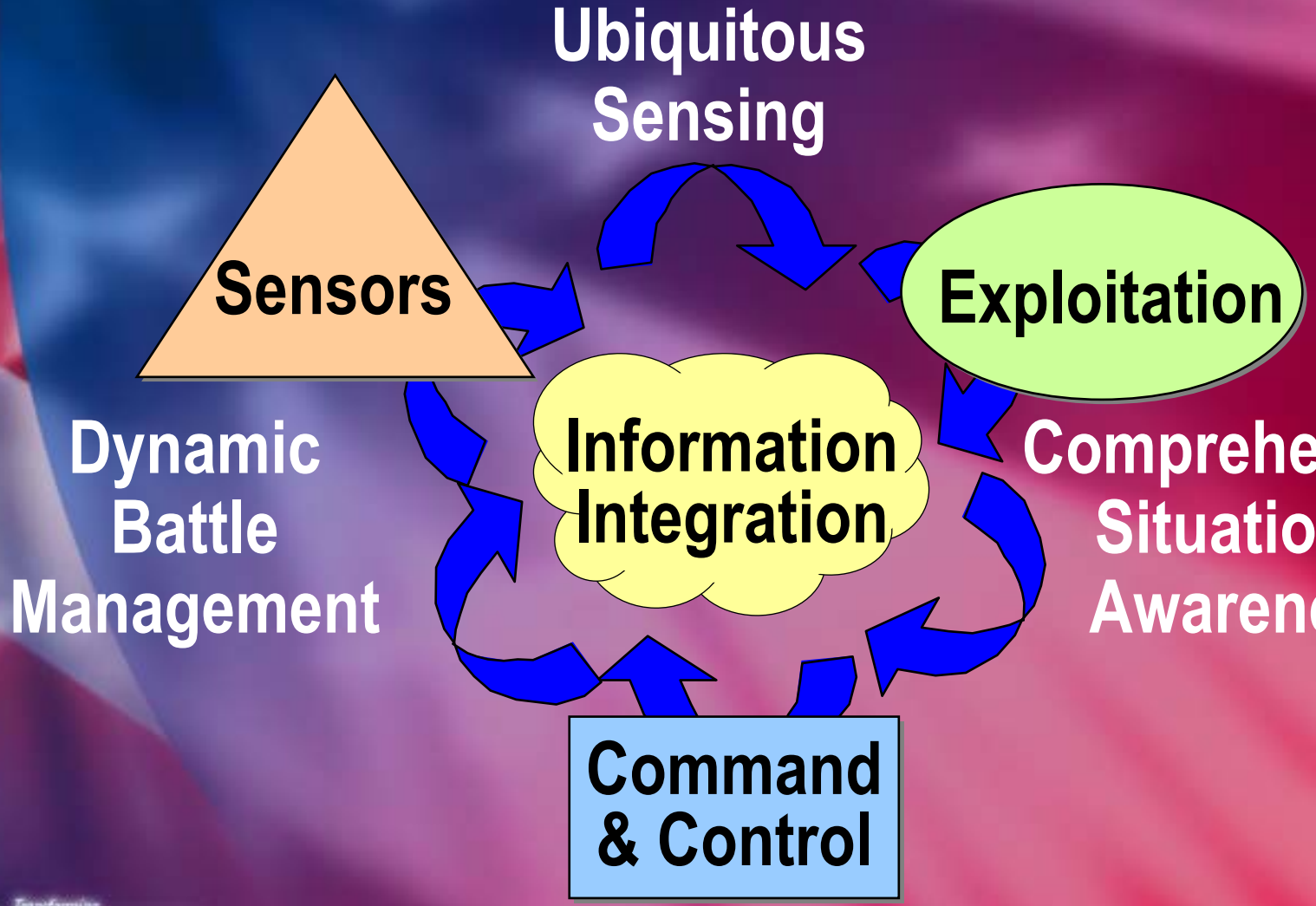
Network-Centric Infrastructure

- Desired Capabilities:
  - Active management of information flows
  - Agile, reconfigurable information systems
- Potential Solutions:
  - Mobile, ad hoc, high capacity wireless communications
  - Real-time allocation of applications to processors
  - Automatic construction of semantic translators

Future Projects

- Wide area surveillance
- Foliage penetration MTI
- High-dimensionality sensing
- Detection and tracking of dismounts
- Automatic target recognition
- Continuous target tracking
- Battlespace prediction
- Dynamic synchronization of assets
- Network-centric enabling technology

Information Exploitation

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